Sept. 9, 1930. A. S. PHELPS 1,775,254

DIPPING MEANS FOR QUENCHING ARTICLES

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Fig. 1.

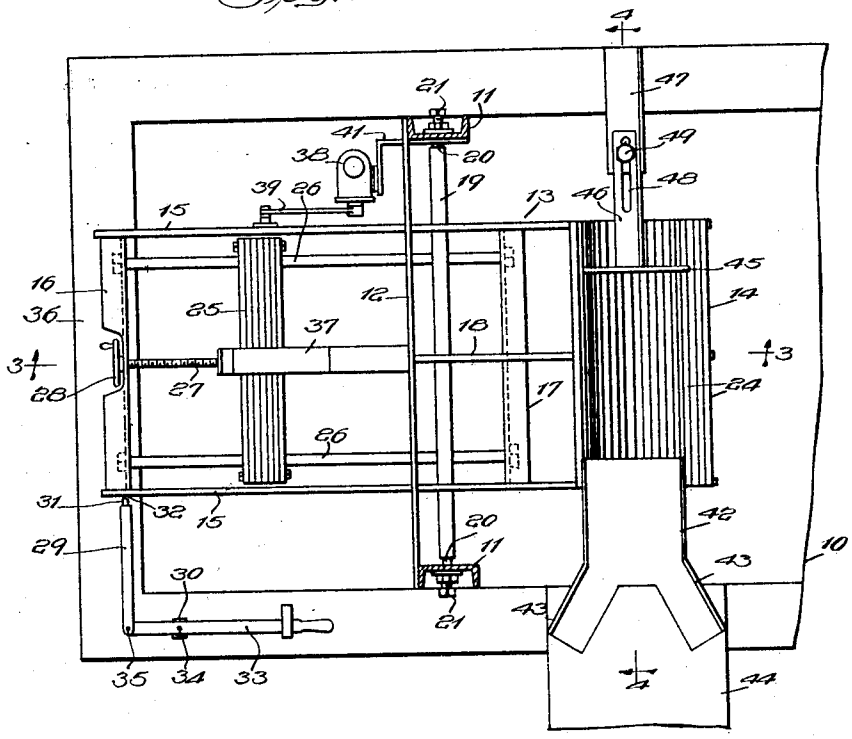
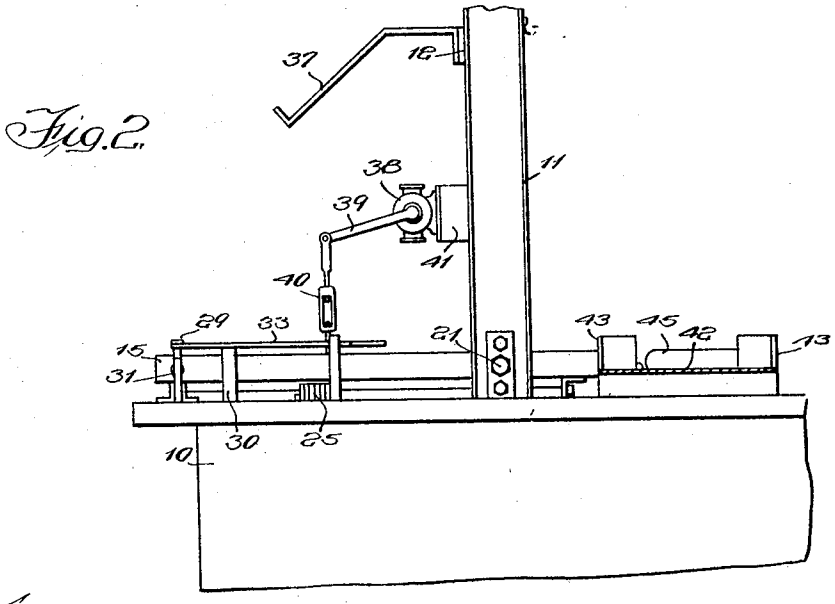


Fig. 2.



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Fig. 3.

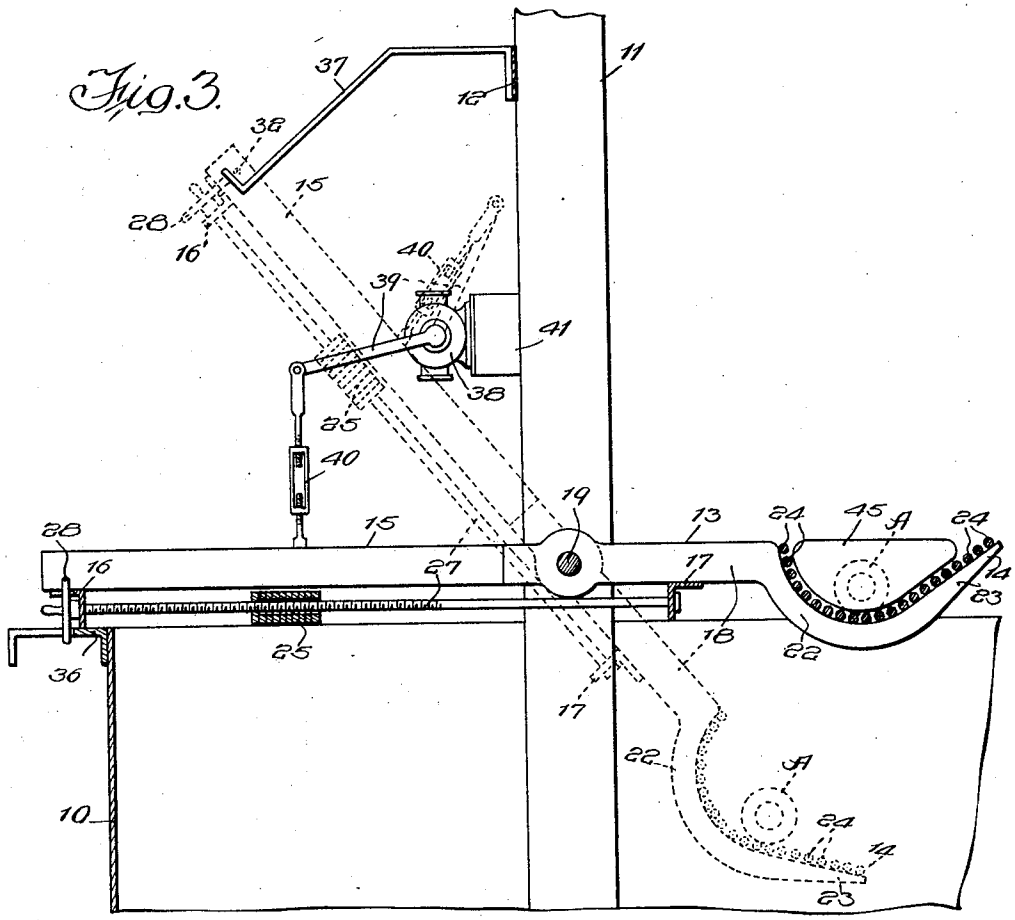
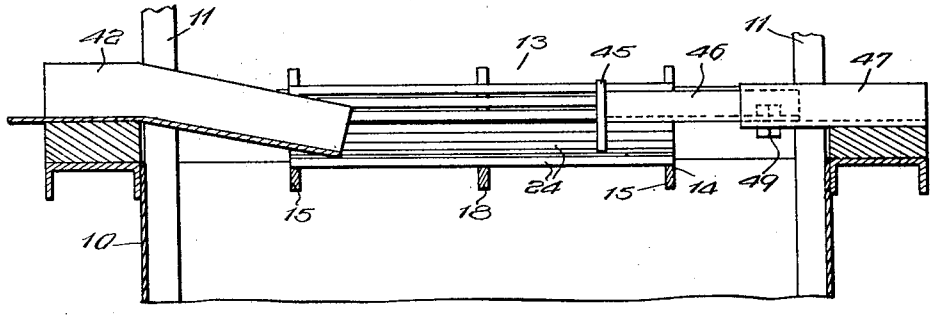


Fig. 4.



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UNITED STATES PATENT OFFICE

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DIPPING MEANS FOR QUENCHING ARTICLES

Application filed December 28, 1928. Serial No. 328,974.

This invention relates to improvements in dipping means for quenching articles.

In the manufacture of helically coiled springs from straight bars, after the bars which are heated have been coiled to helical form on a mandrel, it is the practice to quench the coils in a bath provided for that purpose, the coils being ordinarily brought to the dipping tank and dipped into the quenching bath and removed therefrom manually. Such handling of the coils entails a great amount of labor and frequently in an effort to speed up production the operator accidentally drops the coils into the bath, thus causing splashing of the quenching fluid with resultant waste and frequent injury to the operator by the hot fluid.

One object of the invention is to overcome the deficiencies pointed out, reduce the amount of labor involved, and at the same time speed up production, by providing a dipping mechanism which receives the spring coils from a conveying mechanism and effects a quick immersing of the springs in the quenching bath.

Another object of the invention is to provide a dipping mechanism which comprises a spoon-like receptacle adapted to support the springs and is actuated by the weight of the spring thereon to lower the same into the quenching bath.

A still further object of the invention is to provide a dipping mechanism of the character indicated, including a pivoted dipping member, the receptacle member of which, when empty, is overbalanced by weight means, the weight of a spring member placed in the receptacle overcoming the effect of the overbalancing weight means to lower the receptacle into the quenching bath, wherein the weight means is adjustable so that springs of different weights may be handled with equal facility.

A more specific object of the invention is to provide a mechanism for immersing springs in a quenching bath, including a dipper having a fixed supporting member pivoted between its ends in such a manner that the cup or receptacle part of the dipper will swing downwardly by the action of gravity when weighted by a spring to be immersed, the cup or receptacle member of the dipper being of such a shape as to permit the spring to roll therefrom by the tilting of the cup or receptacle when the dipper reaches its lowermost position, cooperating conveying means being employed to carry the spring coils to the cup of the dipper and also carry the same through the quenching bath.

Other and further objects of the invention will more clearly appear from the description and claims hereinafter following.

In the drawings forming a part of this specification, Figure 1 is a horizontal plan view of a quenching apparatus, illustrating my improvements in connection therewith, certain upright vertical standards being shown in horizontal section. Figure 2 is a side elevational view, partly broken away, of the apparatus illustrated in Figure 1, the chute through which the articles are fed being shown in section. Figure 3 is a vertical, longitudinal, sectional view, partly broken away, corresponding substantially to the line 3—3 of Figure 1. And Figure 4 is a vertical, transverse, sectional view, corresponding substantially to the line 4—4 of Figure 1.

Referring to the drawings, 10 indicates generally the quenching tank of the apparatus, the same being in the form of an elongated trough having vertical side and end walls. A conveying mechanism, not shown, is preferably employed in connection with the tank 10 to carry the articles lengthwise of the same. The tank contains the usual quenching fluid which preferably is oil. The helical spring coils are formed in the usual coiling machine and are conveyed therefrom to the quenching tank. As will be understood, the helical spring coils are formed from substantially straight bars which are properly heated so that the coiling operation may be readily performed. While in the heated condition, the spring coils are taken from the coiling machine and conveyed through a chute, or any other well known means, to my improved dipping apparatus which is associated with the quenching tank 10.

In carrying out my invention, I provide

upright standards 11—11 at opposite sides of the quenching tank, the standards being securely fixed to the framework of the tank and braced at their upper ends by a transverse reinforcing member 12 which is suitably fixed to said standards. The standards 11 serve as a supporting framework for my improved dipping mechanism proper.

The dipping mechanism proper comprises a supporting member 13 pivoted between its ends and having a carrier 14 for the coil springs to be dipped at one end thereof, the carrier 14 being in the form of a spoon-shaped cup. The supporting member 13 comprises a pair of side beams 15—15 connected by an end member 16 and an intermediate member 17 secured to the bottom sides thereof. The members 16 and 17 are preferably in the form of angle bars, as most clearly shown in Figure 3. A central reinforcing beam 18 is also employed, the same being shorter than the beams 15, as most clearly illustrated in Figure 3. The beam 18 is also fixed to the angle bar 17. The beams 15 are pivotally supported between their ends on a shaft 19 extending through the beams 15 and 18, the shaft 19 being provided with sockets 20—20 at the opposite ends thereof in which the inner ends of set screws or bolts 21—21 engage. The bolts 21 are adjustably mounted in the standards 11, the same extending through screw-threaded openings in said standards and each being provided with a lock nut to lock the same to said standard when properly adjusted. As will be evident, the supporting member 13 is thus pivotally supported to swing about the axis of the shaft 19 and by proper adjustment of the set screws 21 an easy swinging movement of the same is had.

The carrier portion 14 of the dipping mechanism is formed at the outer ends of the beams 15 and 18 at the right hand end of the structure, as shown in Figure 3. As shown in said figure, the beams are provided with downwardly offset curved sections 22—22 which form the bowl portion of the spoon-shaped carrier member. At the free end, the beams 15 and 18 are inclined upwardly, as indicated at 23—23, for a purpose hereinafter pointed out. The bottom wall and end wall portions of the carrier member 14 are formed by a plurality of bars 24—24 which are welded to the side members of the carrier, which are continuations of the beams 15 and are supported centrally by the extension of the central beam 18. As shown in Figures 1 and 3, the bars 24 are of cylindrical cross-section and are spaced apart so that they will form a basket-like support through which the liquid may drain when the carrier is lifted out of the quenching tank. As shown in Figure 3, when the supporting member 13 is in horizontal position, the carrier 14 will hold the article placed thereon, but when the supporting member is tilted to the dotted line position shown in Figure 3, the spoon-like carrier will be tilted so that the article will slide or roll from the same. A coiled spring A is shown in dotted lines as disposed within the carrier 14, in Figure 3, the spring being of relatively small diameter. The spoon-shaped section of the carrier is so formed that springs of much greater diameter may be handled with equal facility and will be held on the carrier when the same is in the horizontal position shown in the full lines in Figure 3. As will be evident, when the supporting member is swung downwardly, thereby tilting the carrier, the coiled spring will roll from the carrier by the action of gravity.

In order to overbalance the carrier end of the dipping member and return the dipper member to normal position after the article has been discharged therefrom, counterweights 25—25 are provided. The counterbalancing effect of the weight 25 is preferably such as to permit rapid downward movement of the dipper when loaded so as to immerse the article quickly. As shown, these counterweights are slidably mounted on a pair of spaced guide bars 26—26 at opposite sides of the supporting member, the bars 26 having their opposite ends secured to the vertical flanges of the angle bars 16 and 17. The counterweight members 25 are in the form of elongated bars having guide openings at the opposite ends thereof, through which the guide bars 26 extend. As shown, the bars forming the weight member 25 are preferably bolted together at opposite ends. In order to adjust the weight member 25 lengthwise of the pivoted supporting member 13 so as to accommodate the dipping mechanism for operation on springs of different weights, I provide an adjusting means comprising a rotary shaft 27 having the inner end journaled in the vertical flange of the angle bar 17 and having the outer end journaled in the vertical flange of the angle bar 16. The shaft 27 is provided with an operating hand wheel 28 for rotating the same. The shaft 27 is threaded, as shown. The shaft extends through the bars forming the weight member 25 and the opening which receives the shaft is threaded so that rotation of the shaft in one direction will carry the weight outwardly on the supporting member 13 and rotation of the shaft in the reverse direction will carry the same inwardly. As will be evident, when the weight member 25 is adjusted outwardly, the overbalancing effect will be increased and heavier springs may be handled without danger of the carrier end of the dipping mechanism being swung downwardly too abruptly. When lighter springs are handled, the weight member is adjusted inwardly

on the shaft 27, so as to decrease the overbalancing effect thereof.

In all positions of the weight member 25, the overbalancing effect is such that the carrier end 14 of the supporting member 13 will be maintained in the horizontal raised position above the quenching tank, as shown in Figure 3. In order to provide means for locking the dipping member in horizontal position when desired, a hand-operated latch is preferably provided, comprising a sliding bar 29 mounted on a support 30 at the side of the framework of the mechanism, the end of the bar being provided with a latch finger 31 engaging within a recess 32 in the corresponding side member 15 of the supporting means 13. The sliding bar 29 is operated by a pivoted lever 33 supported between its ends on a pivot 34 and connected to the bar 29 by a pivot 35. As will be evident, when the handle end of the lever is pulled outwardly, the locking finger is engaged within the opening 32 to lock the dipping member in horizontal position and when swung in an inward direction the locking finger 31 will be withdrawn from the opening 32 and the supporting member 13 will be free to swing when weighted at the carrier end by a spring coil.

Upward swinging movement of the carrier end 14 of the dipping member is limited by the transverse angle bar member 16 coming in contact with an angular stop member 36 forming a part of the reinforcing framework at the upper edge of the quenching tank. The supporting member 13 will thus be maintained in proper horizontal position. Downward swinging movement of the carrier end 14 of the dipping member is limited by a stop bracket 37 which is secured to the transverse connecting member 12 for the standards. As shown, the bracket 37 comprises a horizontal top section, a downwardly inclined outer arm and an upstanding free end portion which is adapted to engage with the operating hand wheel 28, thus limiting the upward swinging movement of the corresponding end of the supporting member 13.

As shown, the bracket 37 is preferably secured centrally of the transverse connecting member 12.

As hereinbefore pointed out, one feature of the dipper is to immerse the coil quickly, for which reason the counterbalancing arrangement hereinbefore described, is provided. In order, however, that shock to the apparatus may be eliminated during the return movement of the dipper to normal position, a shock absorber or dampening means is provided. This may take the form of a door check, as illustrated conventionally at 38, the same being secured by bracket 41 to one of the standards 11. The usual lever arm 39 of the check is connected at its outer end by a turnbuckle link 40 to one side beam 15 of the dipper. By means of the turnbuckle, the necessary adjustments can be made, as will be obvious, and it will further be seen that the return stroke of the dipper to normal position will be cushioned, so as to prevent any excessive impacts.

In order to convey the helically coiled spring members to the carrier 14 of the dipping mechanism, a guide chute 42 is mounted on one side wall of the quenching tank 10, the guide chute 42 being inclined downwardly at the inner end, as shown most clearly in Figure 4, and terminating at one side of the carrier 14. The guide chute 42 is provided with side walls having their outer end portions flared laterally outwardly, as indicated at 43—43, in order to properly guide the coils into the carrier. The helically coiled spring members are brought to the dipping mechanism from the coiling machine by any suitable conveying means, indicated at 44 in Figure 1. The conveying means 44 feeds the coiled springs to the chute 42 in succession.

In order to properly center the coiled springs within the carrier 14, a gauge means is provided, the same comprising a vertical gauge plate 45 of the contour shown in Figure 3, the gauge plate being provided with a stem 46 in the form of an angle bar having one of the flanges thereof disposed horizontally and the other vertically. The bar 46 is supported from a bracket 47 fixed to the corresponding side of the frame structure of the quenching tank, the horizontal flange of the bar 46 being slotted, as indicated at 48, to receive a clamping bolt 49 secured to the bracket 47. As will be evident when the clamping bolt 49 is loosened, the gauge plate 45 may be adjusted either inwardly or outwardly so as to cooperate with different lengths of coiled spring members, so that both relatively long and short coils may be properly centered on the carrier 14.

In the operation of my improved dipping device, the helically coiled springs are fed lengthwise along the conveying mechanism 44 and down the chute 42 into the receptacle 23, the same being stopped in centered position by the gauge plate 45. It will be understood that the spring coils, which are fed one at a time, may be placed in position on the carrier 14 in the manner described, either manually or by automatic means. As soon as the spring coil is resting in the carrier 14, the weight of the same will overcome the effect of the overbalancing weight 25 and the tendency will be for the carrier end 14 of the dipping mechanism to be swung downwardly.

As will be obvious, in order to permit the lowering of the carrier and spring coil therein, the finger 31 of the latch must be in the disengaged position shown in Figure 1, thereby permitting the free swinging movement of the dipping member. The carrier, together with the coil spring supported thereon, will thus be lowered quickly into the

quenching bath until substantially the dotted line position of the parts shown in Figure 3 is reached, where swinging movement of the supporting member is arrested by the stop 37. When the parts have assumed this position, the spoon-like carrier member will be tilted to such an extent that the helically coiled spring member will roll from the same into the quenching bath.

As hereinbefore pointed out, the overbalancing weight 25 may be adjusted so that the parts will be properly counterbalanced for operation on different size springs, and the gauge plate 45 may also be adjusted so that different lengths of spring coils may be properly centered within the carrier 14.

When the spring coil has been ejected from the carrier 14, the empty carrier will be overbalanced by the weight 25 and the dipping mechanism will be swung immediately back to the horizontal position shown in Figure 3, ready to receive another coil to be dipped. The conveying mechanism hereinbefore referred to, which is preferably employed in connection with the quenching tank, will carry the coiled springs away from the point at which they are ejected from the spoon-shaped carrier.

While I have herein shown and described what I consider the preferred manner of carrying out my invention, the same is merely illustrative and I contemplate all changes and modifications which come within the scope of the claims appended hereto.

I claim:

1. In a dipping means, the combination with a quenching bath; of a perforate carrier member normally supported above said bath and movable downwardly to lower an article into the bath, said carrier member being actuated by the weight of an article placed thereon for lowering said article into the bath.

2. In a dipping means, the combination with a quenching bath; of a movable carrier having a perforate bottom; overbalancing means for normally holding said carrier in raised position above the bath, said carrier being movable downwardly to immerse an article placed thereon and the effect of said overbalancing means being overcome by the weight of an article placed on said carrier, whereby the carrier, with the article thereon, is lowered into said bath.

3. In a dipping means, the combination with a quenching bath; of a supporting member pivoted between its ends to swing in a vertical plane; a carrier fixed to one end of said arm, said carrier having a perforate bottom wall; and means for weighting the other end of the arm to overbalance said carrier to hold the same in raised position above the bath, the effect of said overbalancing means being overcome by the weight of an article placed on said carrier, whereby the arm is swung on its pivot and the carrier, with the article thereon, is lowered into said bath.

4. In a dipping means, the combination with a quenching bath; of a dipper comprising a spoon-like carrier grid member adapted to receive the article to be dipped and a supporting means rigid therewith, said supporting means being pivoted between its ends to swing in a vertical plane; means for weighting the outer end of said supporting means to overbalance the carrier member when empty, to hold the latter in raised position above said bath, the effect of said overbalancing means being overcome by an article placed on the carrier, whereby the supporting means is swung on its pivot and the carrier, with the article thereon, immersed in said bath.

5. In a dipping means, the combination with a quenching bath; of a supporting means pivoted between its ends to swing in a vertical plane; a perforate carrier for an article fixed to one end of said means; weight means mounted on the other end portion of said supporting means, said weight means overbalancing the carrier when empty and having its overbalancing effect overcome by an article placed on the carrier, whereby said supporting means is swung on its pivot and the carrier, together with the article thereon, lowered into said bath, said weight means being adjustable inwardly and outwardly on said supporting means to change the overbalancing effect to correspond with articles of different weights.

6. In a dipping means, the combination with a quenching bath; of a swinging support mounted above said bath, said support being pivoted between its ends and having arms extending in opposite directions from said pivot point; a grid-like carrier for an article at the outer end of one of said arms; weight means mounted on said other arm for overbalancing the carrier when empty; and means for adjusting said weight means lengthwise of said arm to change the overbalancing effect thereof, the overbalancing effect of said weight means being overcome by the article placed on said carrier to swing said supporting means on its pivot and lower said carrier with the article thereon into said bath.

7. In a dipping means, the combination with a quenching bath; of a swinging dipper normally supported above said bath; overbalancing means for holding said dipper in raised position when the dipper is empty, the effect of said overbalancing means being overcome by the weight of an article on said dipper to swing said dipper downwardly and immerse the article in said bath; and means for dampening the return movement of said dipper.

8. In a dipping means, the combination with a quenching bath; of a swingingly supported carrier normally disposed above said

bath; overbalancing means for holding said carrier in raised position when the same is empty, the effect of said overbalancing means being overcome by the weight of an article on said carrier to swing said carrier downwardly and immerse the article in said bath; and shock absorbing means yieldingly opposing return movement of said carrier.

9. In a dipping means, the combination with a quenching bath; of a swinging supporting member provided with a carrier portion supported above said bath; overbalancing means for holding said carrier in raised position when the same is empty, the effect of said overbalancing means being overcome by the weight of an article on said carrier to swing said support downwardly and immerse the article in said bath; and adjustable gauge means cooperating with said carrier for centering articles of different length thereon.

10. In a dipping means, the combination with a quenching bath; of a swinging dipper normally supported above said bath; automatic means for feeding articles to said dipper; overbalancing means for holding said dipper in raised position when the dipper is empty; and manually controlled means for latching said dipper in raised position.

11. In a dipping means, the combination with a quenching bath; of a dipper swingingly supported above said bath and adapted to be swung to lower an article supported thereon into said bath, said dipper having a spoon-shaped carrier portion shaped to accommodate articles of various diameters; and a gauge member with respect to which the carrier is movable, said gauge member being adjustable for centering articles of different lengths on said carrier.

12. In a dipping means, the combination with a quenching bath; of a framework; a swinging supporting member pivoted between its ends to said framework; a perforate spoon-like carrier at one end of said member, said carrier being adapted to receive an article when said member is in horizontal position, said member being swingable about said pivot in a downward direction to lower the carrier and immerse the same and the article carried thereby in said bath, said spoon-like carrier being tilted due to the downward swinging movement of the supporting member to a position to eject said article into said bath.

13. In a dipping means, the combination with a quenching bath; of a dipping member, including a swinging arm having a spoon-like carrier grid at one end thereof, said spoon-like carrier being adapted to receive and support an article when said arm is in horizontal position with the carrier disposed above said bath, said arm being swingable downwardly to inclined position to immerse the spoon and article thereon in the bath, whereby said spoon is tilted to eject said article into said bath.

14. In a dipping device for articles, the combination with a tank adapted to contain a quenching fluid; of a dipper member including a carrier swingingly supported above the tank and adapted for downward swinging movement to immerse the carrier and an article thereon in said fluid; means for feeding articles successively to said carrier in a lengthwise direction to place said articles transversely of the carrier; and stop means for centering each article on said carrier, said stop means being adjustable for centering articles of different lengths.

15. In a dipping device for helically coiled spring members, the combination with a tank adapted to contain a quenching fluid; of a swinging supporting means pivoted on said frame member, including a carrier at one end thereof, said carrier being movable downwardly to immerse the carrier and the member thereon in said fluid; means for feeding spring members successively to said carrier in a lengthwise direction to place the same transversely of the carrier; and stop means for centering said spring member on the carrier; said stop means being carried by the frame member and adjustable thereon for centering different lengths of spring members.

16. In a dipping device for helically coiled springs, the combination with a quenching bath; of a spoon-shaped member having means for swingingly supporting the same, said spoon-shaped member comprising side arms, which are curved downwardly and have substantially straight free end portions, and a plurality of transverse rods of substantially cylindrical cross section connecting said side arms and forming a basket portion.

17. In a dipping device for helically coiled spring members, the combination with a quenching bath; of a carrier for said spring members, including a spoon-like basket portion adapted to support the articles and be immersed in said bath, said spoon-like basket portion including side members and a plurality of spaced connecting transverse rod elements forming the bottom and end portions of said basket.

18. In a dipping device for helically coiled spring members, the combination with a quenching tank; of a supporting member pivotally arranged above said tank to swing in a vertical plane, said supporting member having a carrier section for the helical spring members at one end, said carrier section including spaced side arms connected by spaced bars forming the bottom and end portions of said carrier section, said side arms and said bar members being offset adjacent the connection with the supporting member to form a curved bowl portion, and said side members

and bars at the free edge portion of said carrier being inclined with respect to the longitudinal axis of said supporting member.

In witness that I claim the foregoing I have hereunto subscribed my name this 3rd day of December, 1928.

ARTHUR S. PHELPS.